This difference in head may be determined for the two extreme flow lines, *bd,* the flow line following the horizontal surface of the crest of the weir, and *ac,* which flows as the free surface of the stream.

Assume that p« designates the hydrostatic pressure of the gas, which is at rest at the point a, and p_a is the hydrostatic pressure of the gas which is in motion at the same point/[1]) These two pressures are evidently equal:

$$p_a = pi \quad \text{.....(a)}$$

The pressure at the point *b* which is located at a distance *H* above the point *a* will be

(b)

||j I A_m being the specific weight of the gas which is in motion.

[1] It should be carefully noted that there are two gaseous mediums present at this point, the one in a state of motion, of which the flow is being studied and the other assumed to be at rest, constituting an atmosphere within which the flowing gas moves.

[2] Knowing the pressure *p$* at the point 6 of a gas, the pressure at any other point *a* at any vertical distance designated *(^0)* as *h* (Fig. 131) may be deduced very easily. The differential equation for the hydrostatic head in the case of all heavy liquids is as follows:

$$dp = {}_P g dz,$$

P designating the density of the liquid.

Now, according to Mariotte's law, the relation for gas will be

$$\frac{P}{P} = \text{constant} = \frac{Po}{Po} = k,$$

from which $\frac{p}{K} = -dz,$ and by integrating, *h* being the difference in level and A_0 the specific weight of the gas at the point 6,

$$L\frac{P}{Po} = -\frac{ff}{*^n}(Z - ZQ) = \frac{gh}{fa} = \frac{PO(7_7}{Po}\text{ti} = \frac{A)}{Po}\text{h}.$$

Passing to the exponential function and taking only the first two terms of the developed series, which give an approximation sufficiently exact for the purpose, by reason of the small value of *h* with regard to the piezometric height —, the following expression is obtained,

AC